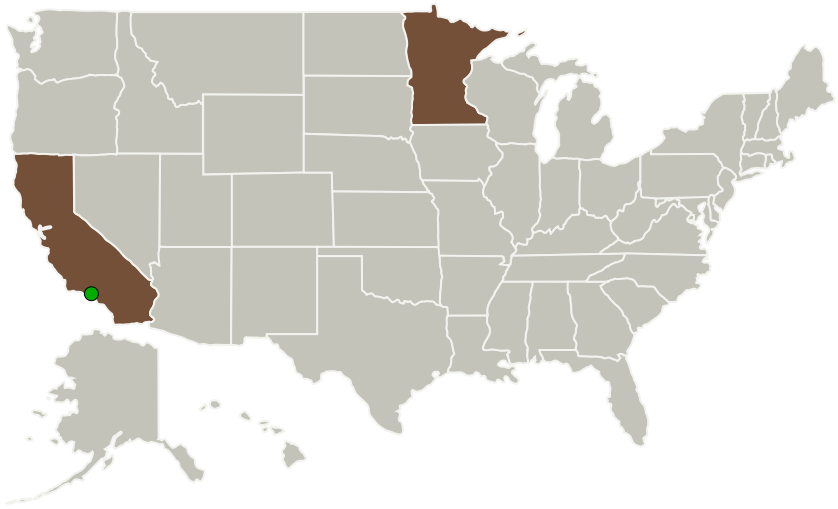
Group III-Nitride LNAs for Microwave Radiometry, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

This phase I proposal addresses the need for microwave and millimeter wave Low Noise Amplifiers (LNAs) for remote sensing applications of the earth's atmosphere. In this work, IIIAN proposes using group III-nitride materials, specifically AlGaN/GaN HEMT structures, to fabricate LNAs for microwave radiometers operating from 165 GHz up to 270 GHz. The group III-nitrides have excellent physical properties for high frequency transistors with the added benefit that the high breakdown voltage of the material renders them less susceptible to failure due to spurious strong signals, eliminating the need for protective circuitry between the antenna and the LNA. Passive microwave radiometers used in the PATH and GACM missions are used to quantify levels of trace species in the atmosphere such as O3, CO, N2O, HNO3, ClO and SO2, and also to estimate water content, both gas phase and as aerosols. The instruments used for these measurements rely on microwave emission from the relevant species. Key to such low signal level measurements are front-end LNAs used to amplify the weak microwave emission signal from the antenna prior to the RF detection diode.

Primary U.S. Work Locations and Key Partners



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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
The IIIAN Company, LLC	Lead Organization	Industry	Minneapolis, Minnesota
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Minnesota

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138188)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

The IIIAN Company, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

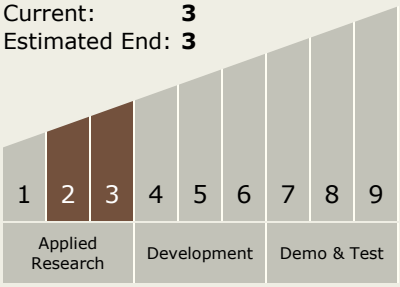
Carlos Torrez

Principal Investigator:

Jody J Klaassen

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System